# ARCHIVES OF
# Biochemistry and Biophysics

Volume 310, 1994

**Academic Press**
San Diego New York Boston London Sydney Tokyo Toronto

Copyright © 1994 by Academic Press, Inc.

All Rights Reserved

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the copyright owner.

The appearance of the code at the bottom of the first page of an article in this journal indicates the copyright owner's consent that copies of the article may be made for personal or internal use, or for the personal or internal use of specific clients. This consent is given on the condition, however, that the copier pay the stated per copy fee through the Copyright Clearance Center, Inc. (222 Rosewood Drive, Danvers, Massachusetts 01923), for copying beyond that permitted by Sections 107 or 108 of the U. S. Copyright Law. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale. Copy fees for pre-1994 articles are as shown on the article title pages; if no fee code appears on the title page, the copy fee is the same as for current articles.

0003-9861/94 $6.00

MADE IN THE UNITED STATES OF AMERICA

This journal is printed on acid-free paper.

# CONTENTS OF VOLUME 310

## Number 1, April 1994

### BIOLOGICAL OXIDATIONS AND P450 REACTIONS


Copper(II)[2,3-Butanedionebis($N^4$-methylthio-semicarbazone)], a Stable Superoxide Dismutase-like Copper Complex with High Membrane Penetrability *Koichi Wada, Yasuhisa Fujibayashi, and Akira Yokoyama* 1

Inhibition of Luminol-Enhanced Chemiluminescence by Reduced Pterins *Rong-sen Shen* 60

Purification and Characterization of a Hepatic Mitochondrial Glutathione S-Transferase Exhibiting Immunochemical Relationship to the $\alpha$-Class of Cytosolic Isoenzymes *Sankar Addya, Jayati Mullick, Ji-Kang Fang, and Narayan G. Avadhani* 82

Spin-Trapping Studies of Peroxynitrite Decomposition and of 3-Morpholinosydnonimine *N*-Ethylcarbamide Autooxidation: Direct Evidence for Metal-Independent Formation of Free Radical Intermediates *Ohara Augusto, Reynaldo M. Gatti, and Rafael Radi* 118

Affinity Isolation and Characterization of Cytochrome P450 102 (BM-3) from Barbiturate-Induced *Bacillus megaterium* *Shaun D. Black, Marlin H. Linger, Lynn C. Freck, Siamak Kazemi, and John A. Galbraith* 126

Two Unique *CYP1* Genes Are Expressed in Response to 3-Methylcholanthrene Treatment in Rainbow Trout *Amy K. Berndtson and Thomas T. Chen* 187

Catabolism of 5-Aminolevulinic Acid to $CO_2$ by Rat Liver Mitochondria *Marisa H. G. Medeiros, Paolo Di Mascio, Sonja Gründel, Sibylle Soboll, Helmut Sies, and Etelvino J. H. Bechara* 205

Spin Trapping of Azidyl and Hydroxyl Radicals in Azide-Inhibited Rat Brain Submitochondrial Particles *Richard S. Partridge, Susan M. Monroe, Janice K. Parks, Kristy Johnson, W. Davis Parker, Jr., Gareth R. Eaton, and Sandra S. Eaton* 210

Photoaffinity Labeling of the Ah Receptor: Phylogenetic Survey of Diverse Vertebrate and Invertebrate Species *Mark E. Hahn, Alan Poland, Edward Glover, and John J. Stegeman* 218

Protein S-Thiolation in Hepatocytes Stimulated by *t*-Butyl Hydroperoxide, Menadione, and Neutrophils *Yuh-Cherng Chai, Suzanne Hendrich, and James A. Thomas* 264

S-Thiolation of Individual Human Neutrophil Proteins Including Actin by Stimulation of the Respiratory Burst: Evidence against a Role for Glutathione Disulfide *Yuh-Cherng Chai, Syed S. Ashraf, Kazuhito Rokutan, Richard B. Johnston, Jr., and James A. Thomas* 273


### BIOPHYSICAL CHEMISTRY AND X-RAY CRYSTALLOGRAPHY


An Electron Microscope and Electron Diffraction Study of the Effect of Calcofluor and Congo Red on the Biosynthesis of Chitin *in Vitro* *Salomon Bartnicki-Garcia, Jan Persson, and Henri Chanzy* 6


### ENZYME STRUCTURE AND MECHANISMS; CELLULAR REGULATION; PHOSPHORYLATION AND DEPHOSPHORYLATION


Interaction of the High-Affinity Inhibitor Tetrahydro-dUMP with the Allosteric Enzyme Deoxycytidylate Aminohydrolase *Roberto Nucci, Ferdinando Febbraio, Gennaro Piccialli, Lorenzo de Napoli, Carlo Vaccaro, Mosè Rossi, and Edward P. Whitehead* 49

Synergistic Effects of Bombesin and Cholecystokinin on Cholesterol Esterase Biosynthesis and Secretion by AR42J Cells *Yan Huang and David Y. Hui* 54

Characterization of a Proline-Directed Casein Kinase from Bovine Brain *Ivo Angelov* 97

Purification and Kinetic Mechanism of the Glutathione S-Transferase from C6/36, an *Aedes albopictus* Cell Line *Gu-Gang Chang, Li-Na Tsai, Shiao-Shek Tang, and Tsing-Cheng Wang* 134

Cloning and Expression of Pigeon Liver Cytosolic $NADP^+$-Dependent Malic Enzyme cDNA and Some of Its Abortive Mutants *Wei-Yuan Chou, Shih-Ming Huang, Yen Hsiao Liu, and Gu-Gang Chang* 158



21 752HI XL 1302
10/94 31249-200

The Effect of *p*-(Chloromercuri)benzoate Modification of Cytosolic Aldehyde Dehydrogenase from Sheep Liver. Evidence for a Second Aldehyde Binding Site
*Jeremy P. Hill, Rosemary L. Motion, Paul D. Buckley, and Leonard F. Blackwell* 256

Probing the Specificity of Nucleotide Binding to the $F_1$-ATPase from Thermophilic Bacillus PS3 and Its Isolated $\alpha$ and $\beta$ Subunits with 2-$N_3$-[$\beta$,$\gamma$-$^{32}$P]ATP
*Jean-Michel Jault, Chitose Kaibara, Masasuke Yoshida, Siv Garrod, and William S. Allison* 282

**GENE EXPRESSION, TRANSCRIPTION, AND TRANSLATION**

Triplex Forming Ability of a c-*myc* Promoter Element Predicts Promoter Strength
*Anthony B. Firulli, Douglas C. Maibenco, and Alan J. Kinniburgh* 236

**GLYCOCONJUGATES AND OLIGOSACCHARIDES; PROTEOGLYCANS AND EXTRACELLULAR MATRICES**

Binding Properties of Glycosaminoglycans to Lysozyme—Effect of Salt and Molecular Weight
*M-P. I. Van Damme, J. M. Moss, W. H. Murphy, and B. N. Preston* 16

Arg–Gly–Asp–Ser Peptide Analogs Suppress Cartilage Chondrolytic Activities of Integrin-Binding and Non-binding Fibronectin Fragments *Gene A. Homandberg and Francis Hui* 40

Basic Fibroblast Growth Factor Binds to Heparan Sulfate in the Extracellular Matrix of Rat Growth Plate Chondrocytes *Shravan K. Chintala, Raymond R. Miller, and Cahir A. McDevitt* 180

A Novel Sialidase Capable of Cleaving 3-Deoxy-D-*glycero*-D-*galacto*-2-nonulosonic Acid (KDN)
*Yu-Teh Li, Jeffrey A. Yuziuk, Su-Chen Li, Asaad Nematalla, Akira Hasegawa, Mariko Kimura, and Hiroki Nakagawa* 243

**LIPIDS, LIPID MEDIATORS, AND GLYCOLIPIDS**

Generation of One Set of Murine Monoclonal Antibodies Specific for Globo-Series Glycolipids: Evidence for Differential Distribution of the Glycolipids in Rat Small Intestine
*Masaharu Kotani, Ikuo Kawashima, Hideki Ozawa, Kiyoshi Ogura, Toshio Ariga, and Tadashi Tai* 89

Post-transcriptional Regulation of 3-Hydroxy-3-methylglutaryl Coenzyme A Reductase by 3$\beta$-Hydroxy-lanost-8-en-32-al, an Intermediate in the Conversion of Lanosterol to Cholesterol
*Deborah A. Leonard, Michael A. Kotarski, June E. Tessiatore, Margaret F. Favata, and James M. Trzaskos* 152

**MEMBRANE PROTEINS AND TRANSPORT; INTRACELLULAR SIGNALS; CYTOKINES AND RECEPTORS**

Ouabain Binding Kinetics of the Rat Alpha Two and Alpha Three Isoforms of the Sodium–Potassium Adenosine Triphosphate *William J. O'Brien, Jerry B. Lingrel, and Earl T. Wallick* 32

Characterization and Subcellular Distribution of G-Proteins in Highly Purified Skeletal Muscle Fractions from Rabbit and Frog *M. Angélica Carrasco, Jimena Sierralta, and Philippe de Mazancourt* 76

*Schistosoma mansoni:* Sm23 Is a Transmembrane Protein That also Contains a Glycosylphosphatidylinositol Anchor *Bärbel Köster and Mette Strand* 108

Identification of Chicken Liver Glucose Transporter *May-yun Wang, Ming-Ying Tsai, and Chung Wang* 172

Intracellular Processes Associated with Vesicular Transport from Endoplasmic Reticulum to Golgi and Exocytosis: Ethanol-Induced Changes in Membrane Biogenesis *Amalia Slomiany, Maria Grabska, Elzbieta Piotrowski, Shipra Sengupta, Masanori Morita, Chinnaswamy Kasinathan, and Bronislaw L. Slomiany* 247

**PLANT BIOCHEMISTRY AND MOLECULAR BIOLOGY**

Purification and Characterization of 3-Methylcrotonyl-Coenzyme-A Carboxylase from Leaves of *Zea mays*
*Tomás A. Diez, Eve Syrkin Wurtele, and Basil J. Nikolau* 64

Biosynthesis of DB58 Lectin in Cell Suspension Cultures of *Dolichos biflorus*
*Danny J. Schnell, Kanji Hori, Steven M. Herrmann, Colin V. Gegg, and Marilynn E. Etzler* 229

**PROTEIN STRUCTURE AND FUNCTION; PROTEASES, PROTEIN TURNOVER, AND POST-TRANSLATIONAL PROCESSING**

The Effects of Histidine Residue Modification on the Immune Precipitating Ability of Rabbit IgG
*Robert O. O'Brien, Philip J. Roeth, Scott A. Thomson, Gavin Bartell, and Simon B. Easterbrook-Smith* 25

A Kinetic Comparison of the Homologous Proteases Astacin and Meprin A *Russell L. Wolz* 144

Active Site Structure and Stability of the Thiol Protease Papain Studied by Electron Paramagnetic Resonance Employing a Methanethiosulfonate Spin Label *D. Allan Butterfield and Jinbo Lee* 167

Expression and Role of the Human Liver UDP-Glucuronosyltransferase UGT1*6 Analyzed by Specific Antibodies Raised against a Hybrid Protein Produced in *Escherichia coli*
*Mohamed Ouzzine, Thierry Pillot, Sylvie Fournel-Gigleux, Jacques Magdalou, Brian Burchell, and Gérard Siest* 196

ERRATUM
Volume 300, Number 1 (1993): Minoru Sawada, Ryuji Kitamura, Satoru Ohgiya, and Tetsuya Kamataki, "Stable Expression of Mouse NADPH–Cytochrome P450 Reductase and Monkey P4501A1 cDNAs in Chinese Hamster Cells: Establishment of Cell Lines Highly Sensitive to Aflatoxin $B_1$," pp. 164–168 289

## Number 2, May 1, 1994

**RESEARCH REPORT**

CD44 Expression in Colorectal Adenomas Is an Early Event Occurring Prior to K-ras and p53 Gene Mutation
*Hoguen Kim, Xiao-Ling Yang, Cecilia Rosada, Stanley R. Hamilton, and J. Thomas August* 504

**BIOLOGICAL OXIDATIONS AND P450 REACTIONS**

Investigation of the Rate Limiting Step for Electron Transfer from NADPH:Cytochrome P450 Reductase to Cytochrome $b_5$: A Laser Flash-Photolysis Study
*Anjan K. Bhattacharyya, John K. Hurley, Gordon Tollin, and Lucy Waskell* 318

Black Swallowtail (*Papilio polyxenes*) Alleles Encode Cytochrome P450s That Selectively Metabolize Linear Furanocoumarins *Runlin Ma, Michael B. Cohen, May R. Berenbaum, and Mary A. Schuler* 332

Characterization of Mn(III) Complexes of Linear and Cyclic Desferrioxamines as Mimics of Superoxide Dismutase Activity *Kevin M. Faulkner, Robert D. Stevens, and Irwin Fridovich* 341

Agonist-Induced Peroxynitrite Production from Endothelial Cells *Neil W. Kooy and James A. Royall* 352

Essential Role of His163 of Cytochrome P450 1A2 in Catalytic Functions Associated with Cytochrome $b_5$
*Hiroshi Mayuzumi, Toru Shimizu, Chiaki Sambongi, Kou Hiroya, and Masahiro Hatano* 367

Comparison of Electron Transfer Kinetics between Redox Proteins Free in Solution and Electrostatically Complexed to a Lipid Bilayer Membrane *G. Cheddar and G. Tollin* 392

Differential Roles of Glu318 and Thr319 in Cytochrome P450 1A2 Catalysis Supported by NADPH-Cytochrome P450 Reductase and *tert*-Butyl Hydroperoxide
*Kou Hiroya, Yoshinori Murakami, Toru Shimizu, Masahiro Hatano, and Paul R. Ortiz de Montellano* 397

Novel Metabolic Pathway of Arylethers by Cytochrome P450: Cleavage of the Oxygen–Aromatic Ring Bond Accompanying *ipso*-Substitution by the Oxygen Atom of the Active Species in Cytochrome P450 Models and Cytochrome P450 *Tomoyuki Ohe, Tadahiko Mashino, and Masaaki Hirobe* 402

Oxidation of Dimethylselenide to Dimethylselenoxide by Microsomes from Rat Liver and Lung and by Flavin-Containing Monooxygenase from Pig Liver *Douglas E. Goeger and Howard E. Ganther* 448

**BIOPHYSICAL CHEMISTRY AND X-RAY CRYSTALLOGRAPHY**

Heme Protein Dynamics Studied by Phosphorescence of an External Phosphorescent Probe Molecule
*Suzy Beckham, Marcus P. Cook, Laba Karki, Mary M. Luchsinger, Valerie R. Whitlock, Ying Wu, Qingfei Zhang, and Merlyn D. Schuh* 440

X-Ray Structure of the Cytochrome $c_2$ Isolated from *Paracoccus denitrificans* Refined to 1.7-Å Resolution
*Matthew M. Benning, Terrance E. Meyer, and Hazel M. Holden* 460

**ENZYME STRUCTURE AND MECHANISMS; CELLULAR REGULATION; PHOSPHORYLATION AND DEPHOSPHORYLATION**

Sulfation of Di- and Tricyclic Phenols by Rat Liver Aryl Sulfotransferase Isozymes
*Matthew H. Parker, Denis J. McCann, and James B. Mangold* 325

Purification and Characterization of the NAD-Preferring Glucose 6-Phosphate Dehydrogenase from *Acetobacter hansenii* (*Acetobacter xylinum*) *Shoba Ragunathan and H. Richard Levy* 360

Mitochondrial Hexokinase in Brain: Coexistence of Forms Differing in Sensitivity to Solubilization by Glucose-6-Phosphate on the Same Mitochondria *Firoz Kabir and John E. Wilson* 410

Characterization of the Putative GTP-Binding Site Residues of *Escherichia coli* Adenylosuccinate Synthetase by Site-Directed Mutagenesis *Chulhun Kang and Herbert J. Fromm* 475

Identification of Chicken Liver Mitochondrial Alanine:2-oxoglutarate Aminotransferase and Its Response to Starvation *Satoko Fujiwara, Haruhiko Sakuraba, and Tomoo Noguchi* 497

**GENE EXPRESSION, TRANSCRIPTION, AND TRANSLATION**

NADPH Cytochrome P-450 Oxidoreductase Gene: Identification and Characterization of the Promoter Region
*Kathleen A. O'Leary, Thomas W. Beck, and Charles B. Kasper* 452

Bovine Heart Fructose 6-*P*,2-kinase:Fructose 2,6-Bisphosphatase mRNA and Gene Structure
*Yoshihiro Tsuchiya and Kosaku Uyeda* 467

**GLYCOCONJUGATES AND OLIGOSACCHARIDES; PROTEOGLYCANS AND EXTRACELLULAR MATRICES**

Cleavage of Epitectin, a Mucin-Type Sialoglycoprotein, from the Surface of Human Laryngeal Carcinoma Cells by a Glycoprotease from *Pasteurella haemolytica* *Rei-Huang Hu, Alan Mellors, and Veer P. Bhavanandan* 300

Branched Monosialo Gangliosides of the Lacto-Series Isolated from Bovine Erythrocytes: Characterization of a Novel Ganglioside, NeuGc-Isooctaosylceramide
*Somsankar Dasgupta, Edward L. Hogan, John Glushka, and Herman van Halbeek* 373

**LIPIDS, LIPID MEDIATORS, AND GLYCOLIPIDS**

Oxidation-Induced Aggregation of Rabbit Low-Density Lipoprotein by Azo Initiator
*Yoshiki Kawabe, Osamu Cynshi, Yoshiaki Takashima, Tsukasa Suzuki, Yasuhiro Ohba, and Tatsuhiko Kodama* 489

**MEMBRANE PROTEINS AND TRANSPORT; INTRACELLULAR SIGNALS; CYTOKINES AND RECEPTORS**

Effect of Cholera Toxin and Pertussis Toxin on Prostaglandin H Synthase-2, Prostaglandin $E_2$, and Matrix Metalloproteinase Production by Human Monocytes
*Marta L. Corcoran, William G. Stetler-Stevenson, David L. DeWitt, and Larry M. Wahl* 481

**PROTEIN STRUCTURE AND FUNCTION; PROTEASES, PROTEIN TURNOVER, AND POST-TRANSLATIONAL PROCESSING**

Nucleotide Recognition by Histone H1 Involves Specific Protein Structures
*Tatu Tarkka, Natalja Yli-Mäyry, Riitta-Maaria Mannermaa, and Jouko Oikarinen* 291

Conformational Studies of a Two-Module Fragment of Nebulin and Implications for Actin Association
*Mu-Jung G. Chen and Kuan Wang* 310

Immunoaffinity Purification of Active Rat Recombinant 1,25-Dihydroxyvitamin $D_3$ Receptor
*Zhuyin Li, Jean M. Prahl, Wendy Hellwig, and Hector F. DeLuca* 347

Interaction of *Trans, Trans*-Muconaldehyde with Bovine Serum Albumin
*Vidya Udupi, Bernard D. Goldstein, and Gisela Witz* 385

Widespread Occurrence of Three Sequence Motifs in Diverse S-Adenosylmethionine-Dependent Methyltransferases Suggests a Common Structure for These Enzymes *Ron M. Kagan and Steven Clarke* 417

Binding of Heat-Shock Protein 70 (hsp70) to Tubulin
*Carlos Sánchez, Rodolfo Padilla, Rosanna Paciucci, Juan C. Zabala, and Jesús Avila* 428

Characterization of Disulfide Linkages in Platelet-Derived Growth Factor AA
*Mitsuru Haniu, Philip Hsieh, Michael F. Rohde, and William C. Kenney* 433

AUTHOR INDEX FOR VOLUME 310 508

NOTICE

The Subject Index for Volume 310 will appear in the December 1994 issue as part of a cumulative index for the year 1994.